AQUATIC NUISANCE CONTROL IN ONTARIO 1974

January 1975

Ontario

Ministry of the Environment

The Honourable
William G. Newman,
Minister

Everett Biggs,
Deputy Minister

AQUATIC NUISANCE CONTROL

IN ONTARIO - 1974

PESTICIDES CONTROL SECTION
POLLUTION CONTROL BRANCH
MINISTRY OF THE ENVIRONMENT

JANUARY, 1975

INTRODUCTION

In an effort to control the addition of pesticides to water by the public for the control of aquatic nuisances, Pesticides Control in close co-operation with the Ontario Ministry of Natural Resources has continued to scrutinize and licence pesticide applications through the Aquatic Nuisance Control Permit System. Under the Pesticides Act, 1973 as amended, permits are granted to individuals having an understanding of the advantages and disadvantages of chemical manipulation of the aquatic environment and who have carefully considered alternate methods of controlling the nuisance condition prior to initiating chemical treatment. Applications to self-contained ponds entirely on private property or applications by municipalities to drainage ditches under very specific conditions are exempt. Under the new legislation, applications to water on other than an individual's domestic premises by municipalities or client groups such as cottage associations, commercial enterprises and resorts, also require a water extermination licence, unless exempt.

This report summarizes aquatic nuisance control activities for 1974 under the following headings:

A. PERMITS ISSUED, outlines the distribution and types of treatments authorized.

B. PUBLIC INQUIRIES AND PERMITS NOT ISSUED, indicates the volume of inquiries received from the public and provides an outline of the reasons behind permit refusals.

C. POST TREATMENT SURVEY, outlines efficacy of 1974 treatment recommendations.

D. CHEMICALS USED, summarizes compounds used, total quantity and acreage treated.

E. EVALUATIONS, outlines experimental programmes undertaken in 1974 by Pesticides Control personnel.

Storage, sale and use of all pesticides is restricted under the new legislation. Inspections of vendor's facilities, checking of sales records and monitoring of treatment applications by provincial pesticide control specialists is ensuring that pesticides are used safely and effectively in Ontario.

PERMITS ISSUED

In 1974 a total of 171 permits were issued under the Pesticides Act, 1973 and Regulations authorizing the use of pesticides to control aquatic nuisances. This figure brings to 1,871 the total number of permits issued since legislation was first enacted in 1962. Table 1 indicates permit distribution over this period.

Since more than one treatment may be incorporated in a single permit, the total number of pesticide treatments is in excess of the total number of permits issued for the year. A breakdown of the 175 treatments authorized in 1974 is provided in Table 2.

Table 3 shows the numbers and types of permits issued for areas under the control of each region of the Ministry of the Environment. The majority of permits were issued for treatments in Central Ontario. Principal water bodies treated in the Kawartha Lakes district (and corresponding number of permits) were Buckhorn Lake (7), Canal Lake (2), Chemong Lake (1), Pigeon Lake (8), Stoney Lake (4), Sturgeon Lake (3) and the Trent Canal System (1). Other principal areas treated were Georgian Bay (10), and a number of farm ponds (15).

A post treatment survey conducted late in the year by Pesticides Control Section showed that 15 permit recipients ultimately decided against pesticide treatments.

TABLE I

ANNUAL PERMIT TOTAL SINCE INTRODUCTION OF THE SYSTEM

YEAR	PERMIT TOTAL
1962	140
1963	64
1964	53
1965	41
1966	110
1967	137
1968	185
1969	219
1970	182
1971	212
1972	207
1973	150
1974	171
	1,871

TABLE 2

COMPOSITION OF 1974 APPROVED TREATMENTS

Type of Control	Number of Treatments*	Number of Permits
Herbicides		150
Algae	36	
Submerged aquatic weeds	110	
Emergents	9	
Piscicides		7
Ministry of Natural Resources	3	
Other	4	
Larvicides		10
Mosquito	5	
Black Fly	5	
Miscellaneous	3	3
	175	170**

* Since more than one treatment may be incorporated in a single permit, the total number of treatments is in excess of the total number of permits issued.

** Addition of one blanket permit to the Ministry of Natural Resources for treatments of less than 1 acre for fish eradication brings the total to 171.

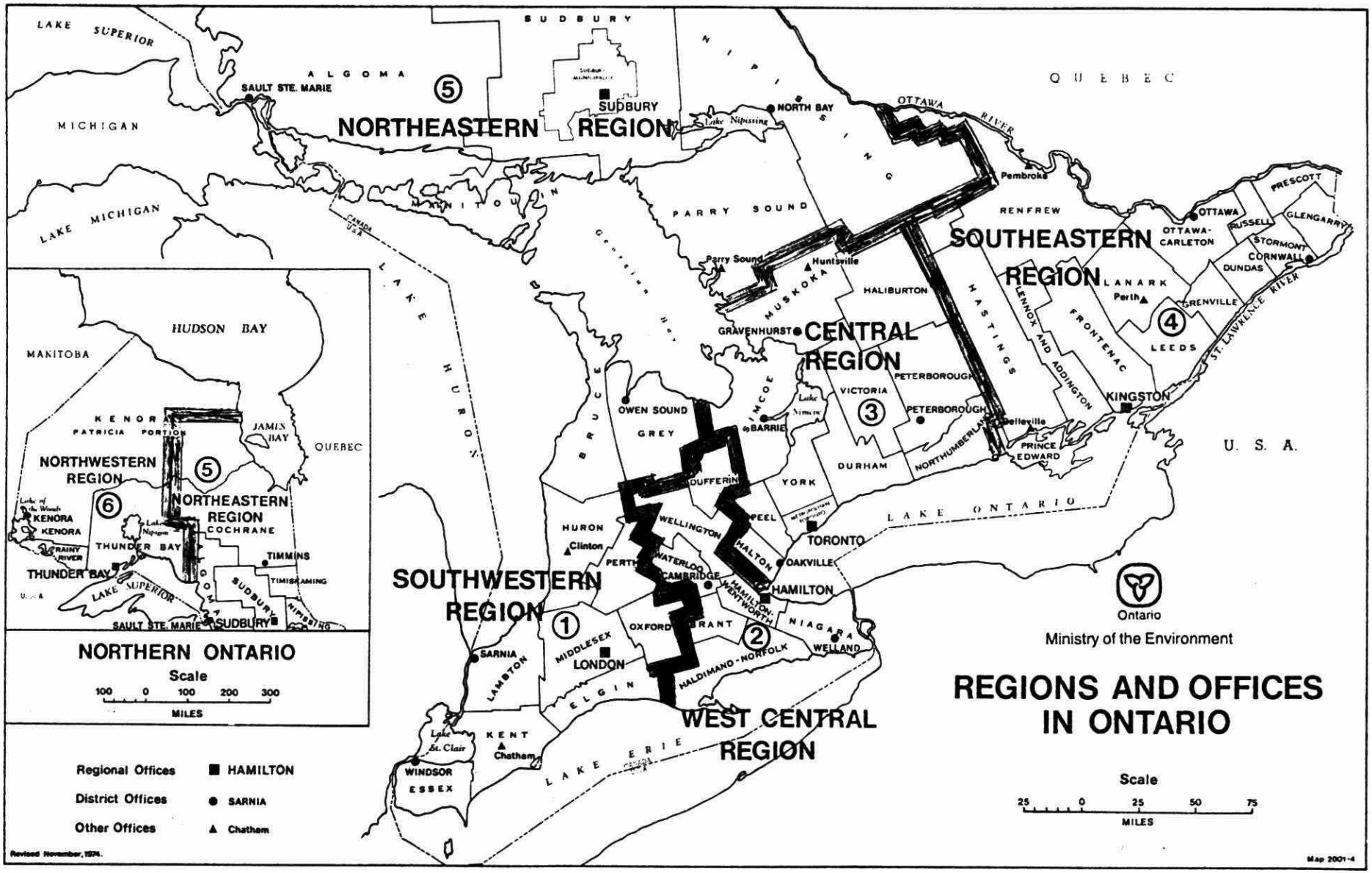
REGIONS AND OFFICES IN ONTARIO
Ontario
Ministry of the Environment
NORTHEASTERN REGION
SOUTHEASTERN REGION
CENTRAL REGION
SOUTHWESTERN REGION
WEST CENTRAL REGION
NORTHWESTERN REGION
NORTHEASTERN REGION
NORTHERN ONTARIO
Scale
MILES
Regional Offices
HAMILTON
District Offices
SARNIA
Other Offices
Chatham
Revised November, 1974.
Map 2001-4
LAKE SUPERIOR
LAKE MICHIGAN
LAKE HURON
LAKE ERIE
LAKE ONTARIO
MICHIGAN
QUEBEC
U. S. A.
HUDSON BAY
MANITOBA
JAMES BAY
SAULT STE. MARIE
SUDBURY
NORTH BAY
PEMBROKE
OTTAWA
KINGSTON
TORONTO
HAMILTON
OAKVILLE
BARRIE
OWEN SOUND
PETERBOROUGH
BELLEVILLE
KENORA
THUNDER BAY
TIMMINS
SARNIA
LONDON
WINDSOR
CHATHAM
WELLAND
ALGOMA
PARRY SOUND
MUSKOKA
HALIBURTON
RENFREW
LANARK
LEEDS
GRENVILLE
PRESCOTT
RUSSELL
GLENGARRY
STORMONT
DUNDAS
CORNWALL
OTTAWA-CARLETON
LENNOX AND ADDINGTON
FRONTENAC
HASTINGS
PRINCE EDWARD
NORTHUMBERLAND
DURHAM
VICTORIA
SIMCOE
GREY
BRUCE
DUFFERIN
YORK
PEEL
HALTON
WELLINGTON
WATERLOO
CAMBRIDGE
HAMILTON-WENTWORTH
NIAGARA
HURON
PERTH
OXFORD
BRANT
HALDIMAND-NORFOLK
MIDDLESEX
LAMBTON
ELGIN
KENT
ESSEX
OTTAWA RIVER
ST. LAWRENCE RIVER
GEORGIAN BAY
LAKE NIPISSING
LAKE SIMCOE
LAKE ST. CLAIR
RAINY RIVER
KENORA PATRICIA PORTION
100 0 100 200 300
25 0 25 50 75

TABLE 3

NUMBERS AND TYPES OF PERMITS IN EACH

REGION OF THE MINISTRY OF THE ENVIRONMENT

Region	Herbicides			Biting Fly Larvicides		Pisci-cides	Miscel-laneous	Total
	Algae	Submergents	Emergents	Black Fly	Mosquitoes			
South Western	5	6	1		1	2		15
West Central	9	3	1		2	2	3	20
Central	20	69	3	1	2	2		97
South Eastern		28		2				30
North Western				1				1
North Eastern	1	4		1		1		7
	35	110	5	5	5	7	3	170*

* The addition of one blanket permit to the Ministry of Natural Resources for treatments of less than 1 acre for fish eradication brings the total to 171.

PUBLIC INQUIRIES AND PERMITS NOT ISSUED

In 1974, the Pesticides Control Section, answered over 1500 inquiries concerning aquatic nuisances and their control; an increase over 1973. An approximate breakdown of these inquiries is as follows:

Subject	Percent of Total Inquiries
Algae and aquatic vegetation control	30
Ponds-water, weed and fish management	15
Black Fly and Mosquito control	15
Leech control	1
Piscicides	3
Swimmer's Itch control	1
Miscellaneous - educational inquiries, etc.	35

In the case of four inquiries, advice was given discouraging the use of pesticides as a remedial measure. In some cases it was felt that pesticide treatment would simply replace one problem with another, while in others the problems were so minor that pesticide use was unwarranted. In addition, six treatments were refused because the applications were received too late in the year for satisfactory treatment results. For effective control, nuisance vegetation must be treated when they are at a particular stage of growth and most vulnerable. Four were refused because control could not be achieved with pesticides under the specified conditions. Two applicants failed to answer correspondence requesting additional information. Three client groups treated without permit authorization and were warned of the consequences of future infractions.

POST-TREATMENT SURVEY

Of the 171 permits issued in 1974, 150 were issued for the use of aquatic herbicides. To assess the effectiveness of recommended herbicide applications, a post-treatment questionaire was circulated to the permittees. Ninety-two completed forms (68%) were returned by the year's end (December 31, 1974). Results of the survey are tabulated in Table 4. Response was greater on the average from those treating submergents in open waters than those implementing pond treatments.

Results of treatments, as judged by the permittees themselves, were generally good to excellent. Poor results were achieved where small areas of open water (less than 500 sq.ft.) were treated and dilution of the chemical used reduced its efficacy. Other factors such as presence of resistant species of vegetation, and inappropriate time of application influenced the results achieved.

The questionnaire brought to light two additional points of interest:

1. 15 permits (5 algicide and 10 herbicide) which had been approved and issued were not undertaken.
2. Inattention to permit stipulations, particularly with respect to time of application, produced poor control in ten treatments, where the chemical was applied later than recommended. Follow-up letters have been mailed to these individuals pointing out this discrepancy.

Owing to the valuable information gained through return of the questionnaires, it is the intention of staff to continue this post-treatment survey procedure. Questionnaire completion will become obligatory with permit issuance in most cases.

TABLE 4

POST-TREATMENT SURVEY 1974

	Number of Replies (92)*	% of Those Responding (77 =100%)	% of Total Herbicide Permits (150)
Type of Treatment			
Algae	15	19.5	23.3 (35)
Submergents	60	77.9	73.3 (110)
Emergents	2	2.6	3.3 (5)
Type of Treatment Area			
Pond, Reservoir	21	27.3	31.3 (47)
Lake, Bay	46	59.7	56.0 (84)
River, Canal	10	13.0	12.7 (19)
Subjective Interpretation of Results of Treatment			
Excellent	24	31.2	
Good	19	24.7	
Satisfactory	13	16.9	
Fair	5	6.5	
Poor	16	20.8	
Number of applicants who obtained a permit prior to 1974	41	53.3	
Number of applicants new in 1974	36	46.7	
Number of applicants wishing renewals for 1975	73	94.8	
Number of applicants not wishing renewals	4	5.2	

* 15 permittees indicated that they did not use any chemical this year.

CHEMICALS USED

The total quantity of pesticides used and acreages treated in 1974 are indicated in Table 5.

TABLE 5

QUANTITY OF CHEMICAL USED AND ACREAGES TREATED UNDER PERMIT IN 1974*

	% Active Ingredient	Quantity Product Used	Number of Treatments	Area Treated
Algicides				
Copper Sulphate	100	69 lbs.	7	21 (acre-ft)
Cutrine	7.1	24 Imp.gal.	6	38.5(acre-ft)
Diuron (Karmex)	80	57 lbs.	5	3.5(acres)
Simazine (princep)	80	97 lbs.	6	6.6 (acres)
Herbicides				
2,4-D (Aqua Kleen)	20	415 lbs.	3	4 (acres)
Diquat (Reglone "A")	20	460 Imp.gal.	90	234(acres)
Amitrole	Varies	0.8 lb.active	1	2100(sq.ft)
Dalapon	74	none	none	none
Gramoxone (Paraquat)	20	0.25 Imp. gal.	1	.25(acres)
2,4-D low volatile iso-octyle ester	Varies	33 fl.oz.acid	4	1 (acre)
Piscicides				
Noxfish	5	34 Imp. gal.	1	205.3(acre-ft)
Warbicide 5(rotenone)	5	4814 lbs.	6	1203 (acre-ft)
Biting Fly Larvicides				
Abate 2G	2	40 lbs. +	2	12.5+ (acres)
Abate 4E	43	unknown	6	unknown
Abate 5C	.26 gm/cap	170 capsules	1	3.9 (acres)
Methoxychlor (Marlate 2MR)	24	unknown	1	unknown
Research				
Terbutryn granular	1	157.4 lbs	10	8.8 (acre-ft)
Terbutryn	500 gm/l	1.34 Imp. gal.	4	21.3 (acre-ft)
Glyphosate	416 amine/ US gal.	.8 Imp. gal.	1	1 (acre)

TABLE 5 - Continued

	% Active Ingredient	Quantity Product Used	Number of Treatments	Area Treated
Research: - Continued				
Diquat-paraquat Mixtures	20	1.3 Imp.gal.	2	.13(acre)
Miscellaneous				
Sarsaponin (microaid digestion activator)	10	.1 lb active/day as required	1 (permit)	unknown
Chlorine (calcium hypochlorite)	70	100-200 lbs/day as required to maintain 2.0 ppm residual chlorine	2 (permits)	unknown

* Total authorized quantities minus totals not used as known December 31, 1974.

Herbicides

As outlined in the Ontario Ministry of Agriculture and Food Publication 75, the 1974 aquatic herbicide recommendations included copper sulphate or Cutrine (algae); simazine or diuron (algae and submergents); diquat (submergents); 2,4-D iso-octyl ester (water lilies); dalapon, amitrole, paraquat or 2,4-D amine (emergents); and granular 2,4-D ester or amine (water milfoil only).

As in previous years, diquat (Reglone"A") was the most commonly used herbicide for the control of submerged aquatic weeds particularly water milfoil which constituted the major nuisance problem in the province. Ninety-nine of the 110 (90%) submergent vegetation control permits authorized the use of this chemical.

In general, problem areas in weed management with herbicides still exist and continue to plague cottagers and pond owners in certain sections of the province. These remain essentially unchanged from previous years and are listed as follows in order of diminishing importance:

1. Control of dense communities of mixed submergents including Canada water weed, pond weeds and water milfoil in small areas fronting individual cottages where reinvasion from adjacent areas and optimum growing conditions reduce efficacy of a herbicide treatment to much less than one summer season.
2. In areas where previous treatments have encouraged the spread and plant community dominance of tape grass (Vallisneria americana), herbicides currently recommended do not provide satisfactory control.
3. Control of the musk grass (Chara sp.) a plant-like algae in spring-fed, hard water trout ponds is difficult where manipulation of water flow is not possible.
4. Control of filamentous green algae in on-stream ponds may last only a few days where continual reinfestation by stream input is high.
5. Control of nuisance vegetation (filamentous algae, Chara, pondweeds and/or woody herbaceous plants) in irrigation canals and drainage ditches is not advisable where significant transport of herbicide from the site of application by moving water presents a potential hazard to crops and livestock utilizing the treated water.

Larvicides

Black fly and mosquito larviciding accounted for less than 6% of the permitted treatments. A breakdown of the 10 permits issued is shown in Table 6.

TABLE 6

LARVICIDE PERMITS 1974

Purpose of Treatment	Number of Permits	Applicant	Chemical
Black Fly Larvae Control	1	Ontario Hydro	Methoxychlor
	2	Municipalities	Abate 4E
	1	Tourist area	Abate 4E
	1	Industry	Abate 4E
Mosquito	1	Municipality	Abate 2G (+Abate 4E)
Larvae Control	1	Golf Club	Abate 5C
	1	Tourist Resort	Abate 4E
	2	Research	Abate 2G

Larvicidal materials for both mosquitoes and black flies were applied at specified rates which were recommended for infested areas within the approved treatment period. The total quantity of chemical was calculated on the site to incorporate important variables: exact stream velocity in the case of black fly larviciding, and exact area of infested standing water in the case of mosquito larviciding.

Piscicides

Seven permits were issued authorizing fish control activities, three permits to the Ministry of Natural Resources and four to private pond owners and associations. Rotenone was the fish toxicant used in all operations, either as Noxfish or Warbicide 5. The use of 34 gallons of Noxfish was authorized

(in one permit) to treat 205.3 acre-feet of water and 4814 lbs. of Warbicide 5 was authorized (in six permits) in treatment of 1203 acre-feet. Also, a blanket permit was issued to the Ministry of Natural Resources for treatment of areas less than 1 acre in size to facilitate spot sampling of fish populations and small reclamation projects.

EVALUATIONS

Diquat-paraquat mixtures (1:1 and 2:1) applied at the rate of 2ppm total active ingredient (4 times the general recommended rate) to flowering tape grass (Vallisneria americana) early September failed to suppress foliage development, seed maturation or rhizome formation in the mature plants. Treatment was made underwater with scuba equipment at dusk to reduce all possible sources of interference.

Glyphosate (n-phosphonomethyl glycine) was tested mid-August on wild rice (Zizania aquatica) in flower by spray boom at a rate of 3 pound acid per acre (3.3 kg acid per hectare). Early browning of the foliage and seed malformation was observed; follow-up next year will determine long term effects. Testing was also done at the University of Guelph with glyphosate 2 and 3 pounds active per acre on cattails at the post flower stage August 16th. Grass burn-off was evident after three weeks; further observations will be made next year. A check of glyphosate treatments made July 4 and July 25, 1973, indicate that complete control of cattails was achieved with 4 lb. active/acre. Use of 2 lb./acre was not as effective.

Terbutryn, one of the components of CIBA-Geigy's A-3777 triazine mixture tested in 1973 was the focus of various

trials this summer. Nuisance plants, formulation (Swiss or U.K., liquid or granular), time of application and trial sites (ponds and lakes) were varied to determine its range of efficacy. Results of granular formulation (U.K.) show promise in the control of moderate stands of narrow-leafed pondweeds and musk grass (Chara sp.) in ponds with restricted water flow at a rate of 0.1 ppm active. Limited control of some species of filamentous green algae (i.e. Spirogyra sp., Cladophora sp. and Mougeotia sp.) was achieved in static water at 0.05 ppm active. Reinvasion or recovery of nuisance algal populations varied with weather conditions and nutrient input. Field trials on tape-grass and other mixed submergents in Pigeon Lake in late July showed some suppression of growth in sheltered areas where higher rates of granular were used (0.3 and 0.4 ppm a.i.). Studies are incomplete at this time.

Further tests on Aquashade (FMC) and Cutrine granular (Applied Biochemists) were not undertaken in 1974.

A mosquito control program was undertaken by the City of Orillia this spring with Ministry guidance against the spring Aedes population. Use of larvicide only (Abate granular and liquid) with careful planning and monitoring reduced the biting adult population by approximately 95%. Preparation of a report on this study is currently under way.

EXPERIMENTAL WEED HARVESTING

A Status Report Provided by the Water Resources Branch, Ministry of the Environment

The experimental harvesting programme was initiated in Southern Chemung Lake in 1973, for the purpose of assessing

both the ecological and the practical implications of large-scale vegetation removal. Specifically, concurrent with the harvesting efforts, detailed studies are underway to monitor changes in fish populations, fish food organisms and in the plant populations including shifts in species composition, rates of regrowth and optimum cutting times. On the practical side, the Water Resources Branch is evaluating the capabilities and limitations of existing machinery and investigating potential methods of recycling the harvested plant material into usable products such as soil additives and livestock feeds.

To date no undesirable biological effects, such as, significant changes in the fisheries or increases in phytoplankton levels have been noted. However, possible changes in the juvenile age groups of the game fish are difficult to detect and may not be apparent within a limited time span. Similarly, the implications of the removal of considerable numbers of small forage fish (i.e. perch, sunfish, minnows) which are trapped in harvested vegetation have not been fully assessed.

Harvesting operations were commenced in early August in 1973, and in mid-June in 1974, utilizing an Aquamarine Harvester with a variety of transport barges and shoreline conveyor systems. Harvesting rates are generally low ranging between 0.45 and 0.55 acres per hour, thus emphazing the need for additional mechanical modifications to produce a more satisfactory rate. Based on the regrowth of vegetation in the harvested areas, it is apparent that a second cutting is required particularly in areas infested with water milfoil. An average of 3 tons of vegetation was removed per acre and trucked to adjacent farms for disposal. In most cases, the vegetation was

composted throughout the summer and applied to the fields with manure spreaders and cultivators in early fall.

In an attempt to find commercial uses for the harvested vegetation, experimental quantities were pelletized at an alfalfa meal plant, ensilaged and composted by an aerobic process. Feeding trials are currently underway at the University of Guelph to establish the usefulness of the silage and pellets as livestock feeds. Also, greenhouse trials with the composted plants are in progress. Following completion of these experiments the economics of processing the plant material into livestock feeds or soil additives must be investigated to ensure a viable operation. Naturally, the unresolved problems encountered to date are extensive. Specifically, the high water content of the plants, usually in the realm of 90% by weight poses a major problem in terms of energy requirements for drying prior to processing, transportation and spoilage during transit.

DISCUSSION

In excess of 1500 public inquiries concerning aquatic nuisance problems were handled by the Ministry of the Environment, Pesticides Control Section, located at 1 St. Clair Avenue West. In addition information kits were distributed from regional offices of the Ministry of the Environment as well as the Ministry of Natural Resources. The number of inquiries and permits issued increased over 1973, in response to increased nuisance weed populations particularly water milfoil in the Kawartha - Trent River system and Rideau Lakes system. The quantity of herbicide and acreages treated in 1974 did not increase from the previous year. Approximately half the permittees had previously used aquatic herbicides and were satisfied

with the measure of control achieved by this weed management method. Ninety-five per cent of this year's clientel have indicated that they intend to mount similar programmes next year in spite of the poor control achieved in some cases this year. This may reflect the growing concern that nuisance weeds are becoming more of a problem in our recreational lakes and some management tool is necessary. Although herbicides are effective in control of most species of aquatic vegetation, large scale and total lake control programmes are discouraged by the Pesticides Control Section because of the significant impact any large scale chemical destruction of vegetation will make, both in terms of water quality and wildlife and/or fisheries habitat alteration. The safe use and sound management of pesticides in and on water has become a very important goal of the Pesticides Control Section. The success of this goal must by necessity involve educational programmes, interaction and co-operation among all involved persons, whether they have an aquatic problem, are making recommendations or are interested parties. Our programme under the Pesticide Act, 1973 and Regulations concerning licence and permit requirements for water exterminations tries to implement this basic philosophy and educational responsibility. Anyone anticipating implementation of an aquatic nuisance control programme should contact the Pesticides Control Section or the regional staff of the Ministry of the Environment.

This report was prepared by Miss. D. L. MacKenzie, Biology and Aquatic Nuisance Specialist, Pesticides Control Section, Pollution Control Branch. Further information may be obtained by writing, 135 St. Clair Avenue West, Toronto, Ontario M4V 1P5, Telephone: (416) 965-2401.

REGIONAL AND DISTRICT OFFICES

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PETERBOROUGH	139 George Street, PETERBOROUGH, Ontario K9J 3G7	Tel:	(705) 745-4601
STONEY CREEK	Centennial Plaza, 140 Centennial Parkway North, STONEY CREEK, Ontario L8E 1H9	Tel:	(416) 561-7412
CAMBRIDGE	P.O. Box 219, Clyde Road, CAMBRIDGE (GALT), Ontario N1R 5W6	Tel:	(519) 623-2080
SIMCOE	P.O. Box 473, 1 Robinson Street, Suite #9, Woolworth Building, SIMCOE, Ontario N3Y 4L5	Tel:	(519) 426-1940
NORTH BAY	Northgate Shopping Centre 1500 Fisher Street, NORTH BAY, Ontario P1B 2H3	Tel:	(705) 476-1001
TIMMINS	P.O. Box 1330, 46 Main Street, TIMMINS, Ontario P4N 2V3	Tel:	(705) 264-9474
THUNDER BAY	Ontario Government Building, 435 James Street South, P. O. Box 5000, THUNDER BAY (F), Ontario P7E 6E3	Tel:	(807) 623-5591
BELLEVILLE	15 Victoria Avenue, BELLEVILLE, Ontario K8N 1Z6	Tel:	(613) 962-9208
OTTAWA	2378 Holly Lane, Suite #204, OTTAWA, Ontario K1V 7P1	Tel:	(613) 521-3450
LONDON	985 Adelaide Street South, LONDON, Ontario N6E 1V3	Tel:	(519) 681-3600
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